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03670 - [A2653832] ~~Restricted~~

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The Concorde: Results of a Supersonic Aircraft's Entry into the United States. CED-77-131; B-166506. September 15, 1977. 35 pp. + 2 appendices (2 pp.).

Report to Rep. Leo J. Ryan, Chairman, House Committee on Government Operations: Environment, Energy, and Natural Resources Subcommittee; by Elmer B. Staats, Comptroller General.

Issue Area: Environmental Protection Programs: Environmental Protection Standards (2201).

Contact: Community and Economic Development Div.

Budget Function: Natural Resources, Environment, and Energy: Pollution Control and Abatement (304).

Organization Concerned: Department of Transportation; Environmental Protection Agency.

Congressional Relevance: House Committee on Government Operations: Environment, Energy, and Natural Resources Subcommittee.

Authority: Federal Aviation Act of 1958. Noise Control Act of 1972. Federal Aviation Regulation 36. Federal Aviation Regulation 91.55.

The Concorde supersonic aircraft is noisier than any subsonic aircraft presently in commercial service. Currently produced Concorde's do not and cannot be modified to meet present noise standards for subsonic aircraft. Permitting the Concorde's introduction into the United States is counter to the thrust of the national noise abatement effort. The Federal Aviation Administration conducted surveys of public opinion during the Concorde trial period at Dulles International Airport to determine community reaction. Findings/Conclusions: Public opinion surveys conducted at Dulles do not provide reliable information because of problems with the survey's sampling plan, questionnaire design, application, and coding and processing of responses. Voluntary complaints are a more significant indicator of the public's response to the trials at Dulles. Although Concorde operations accounted for less than one percent of the take-offs and landings at Dulles, they resulted in 1,387 complaints or 79% of the total noise complaints received. The greatest percentage of Concorde complaints concerned take-off, which is consistent with Concorde noise characteristics. An analysis of 16 media outlets by a contractor concluded that citizens' complaints resulted largely from direct exposure to Concorde and were influenced unduly by the media.
(Author/SW)

Released

9/16/77

03670
UNITED STATES
GENERAL ACCOUNTING OFFICE

REPORT OF THE COMPTROLLER GENERAL OF THE UNITED STATES

The Concorde--Results Of A Supersonic Aircraft's Entry Into The United States

The Concorde supersonic aircraft is noisier than any subsonic aircraft presently in commercial service. Current-production Concorde do not and cannot be modified to meet present noise standards for subsonic aircraft. Permitting the Concorde's introduction into the United States is counter to the thrust of the national noise abatement effort.

The Federal Aviation Administration conducted surveys of public opinion during the Concorde trial period at Dulles International Airport to determine community reaction. GAO believes the information obtained from these surveys is unreliable and should not be used in the formulation of policy towards the Concorde.

Noise complaints received indicate a negative Concorde response. The number of complaints at Dulles increased from a 3-year total of 77 to 1,762 during the first 12 months of Concorde operations. Of these, 1,387 (79 percent) were Concorde complaints.

Although GAO's review dealt only with the Concorde's noise aspects, decisions affecting this aircraft are considered to have important implications for the U.S. economy and U.S. international relations.

SEPTEMBER 15, 1977



COMPTROLLER GENERAL OF THE UNITED STATES

WASHINGTON, D.C. 20548

B-166506

The Honorable Lec J. Ryan
Chairman, Environment, Energy, and
Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

As requested in your May 25, 1977, letter we have reviewed the Government's monitoring of the noise pollution effects from the Concorde supersonic aircraft. On September 7, 1977, we summarized the results of our review in testimony before your Subcommittee. This is our full report on the subject.

The Department of Transportation/Federal Aviation Administration is finalizing a notice of proposed rulemaking concerning supersonic aircraft. My staff attempted to obtain a copy of this document, as well as a National Academy of Sciences analysis of the Concorde noise public opinion surveys, but we were not provided copies for analysis. Subsequently, at your request we sent a letter to the Secretary of Transportation on September 6, 1977, formally requesting copies of these documents. We will give you our analysis when these documents are obtained.

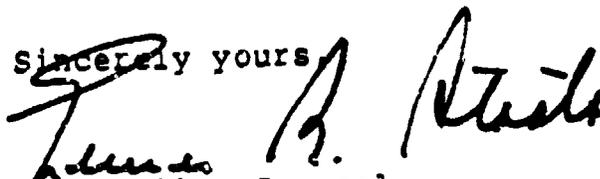
In reference to the August 4, 1977, letter signed by you and other members of Congress regarding the Concorde's low-frequency rattle-vibration noise, we met on August 16, 1977, with representatives of the various agencies involved. They agreed to respond to me by September 16, 1977, and indicate what each agency could do in the development of a low-frequency vibration index for the Concorde (provided one is needed). We will also keep your Subcommittee apprised of further developments in this matter.

B-166506

We met with Department of Transportation and Environmental Protection Agency officials to obtain their comments on our findings and we have recognized these comments to the extent appropriate in finalizing this report.

As arranged with your office, we will make this report available to other interested parties 2 days after the issue date.

Sincerely yours

A handwritten signature in black ink, appearing to read "Thomas A. Steitz". The signature is written in a cursive style with a large initial "T" and "S".

Thomas A. Steitz
Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE SUBCOMMITTEE
ON ENVIRONMENT, ENERGY,
AND NATURAL RESOURCES
HOUSE GOVERNMENT OPERATIONS
COMMITTEE

THE CONCORDE--RESULTS OF A
SUPERSONIC AIRCRAFT'S ENTRY
INTO THE UNITED STATES

D I G E S T

The supersonic Concorde is noisier than subsonic aircraft presently in commercial service in the United States. It does not meet present U.S. subsonic noise standards and cannot be modified or retrofitted to reduce its noise level. Permitting the introduction of a supersonic aircraft that cannot presently meet, or be modified to meet, U.S. noise standards would be a backward step in the national noise abatement program effort. (See p. 35.)

While the Concorde's adverse noise effects were the only issue GAO was asked to examine, it is obvious that decisions affecting the Concorde will have important implications for the U.S. economy and U.S. international relations.

Many legal and administrative actions have been taken since the application by the British and French for Concorde operating rights in the United States. Both the Federal Aviation Administration and the Environmental Protection Agency have either proposed or stated their intentions to propose noise regulations for supersonic aircraft.

The Secretary of Transportation established a 16-month trial period at Dulles and John F. Kennedy International Airports to obtain data necessary for determining whether or not the Concorde should be permitted to operate in the United States permanently. (See p. 3.)

The Concorde has been landing at Dulles (a Government-owned airport) since May 1976. Meanwhile, the Port Authority of New York and New Jersey temporarily banned the Concorde from landing at Kennedy because of its noise levels and low-frequency vibrations. The British and French airlines filed suit to invalidate this ban. There have been decisions, reversals, and subsequent appeals, but the legal issues have not been resolved.

The issue of supersonic aircraft noise regulations is likewise not resolved. The Federal Aviation Administration has prepared a draft notice of proposed rulemaking on supersonic aircraft and plans to issue it in the near future (to date GAO has not been provided a copy for analysis). (See p. 15.)

Public opinion surveys conducted at Dulles by the Federal Aviation Administration will not provide reliable information on the public response to Concorde operations because problems exist with the survey's sampling plan, questionnaire design, application, and coding and processing of questionnaire responses. Because of these problems, and the difficulty of interpreting the results, GAO questions the validity of the community response surveys and does not recommend using these results in the formulation of policy on supersonic aircraft. (See p. 28.)

Voluntary complaints are a more significant indicator of the public's response to the trials at Dulles. The number of noise complaints received at Dulles increased during the Concorde trial period from a 3-year total of 77 prior to the trial period to 1,762 during the first 12 months of Concorde operations. Of these, 79 percent were complaints about Concorde. In that period, Concorde accounted for less than one percent of total operations at Dulles. (See p. 23.)

The great percentage of Concorde complaints concerned takeoff. This is consistent with Concorde noise characteristics. Although the number of Concorde operations was small, the number of complaints did not decrease as the trial continued and, in GAO's opinion, this indicates a negative community response.

Based on an analysis of 16 media outlets, a Federal Aviation Administration contractor concluded that the Concorde is perceived as both a local and national issue. His analysis showed that the coverage of the Concorde during the trial period generally was more negative than positive. It was also concluded that the citizens' complaints about Concorde resulted largely from direct exposure to Concorde and were not influenced unduly by newspapers, magazines, or television. (See p. 26.)

The noise-monitoring system at Dulles included both mobile and fixed monitors. After a year of Concorde operations, noise levels recorded approximated closely those in the Department of Transportation's September 1975 Environmental Impact Statement. At that time it was estimated the perceived loudness or noisiness of the Concorde under the takeoff flight path would be double that of a Boeing 707, four times that of a Boeing 747, and eight times that of a McDonnell-Douglas DC-10.

On August 4 of this year the Comptroller General was asked by several members of Congress to coordinate and monitor efforts among the Department of Transportation, Environmental Protection Agency, and the National Aeronautics and Space Administration in their attempts to develop a standard for the Concorde's low-frequency vibration and rattle effect.

These agencies have agreed to decide what each could usefully do in the development of a low-frequency vibration index, provided it is determined that such an index is needed, and make the results available to GAO by September 16, 1977. GAO will keep the Subcommittee apprised of these efforts. (See p. 12.)

GAO met with Department of Transportation and Environmental Protection Agency officials to obtain their comments and they generally agreed with the findings in this report.

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ABBREVIATIONS

DOT	Department of Transportation
EPA	Environmental Protection Agency
EPNdB	effective perceived noise levels in decibels

ABBREVIATIONS

FAA Federal Aviation Administration
F.A.R. Federal Aviation Regulation
CAO General Accounting Office
NASA National Aeronautics and Space Administration
SST Supersonic transport

CHAPTER 1

INTRODUCTION

The Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, in a letter dated May 25, 1977, requested that we review certain aspects of the landings of the Concorde supersonic transport aircraft in the United States. (See App. I.)

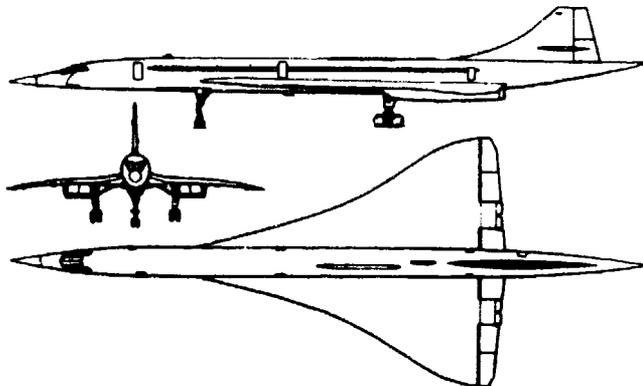
DESCRIPTION OF CONCORDE

The Concorde is the first-generation application of supersonic aeronautical technology to the development of a civil transport aircraft. The Concorde is the common project of the governments of the United Kingdom and the Republic of France.

In terms of structure, the aircraft has four engines located under the wings, is 204 feet long (a Boeing 707 is 153 feet long) and, because the high speeds at which it travels dictate an external shape different from conventional subsonic aircraft, the Concorde has a delta wing design and a wing span of 84 feet (a Boeing 707's wing span is about 140 feet). The Concorde is a long-range supersonic civil transport aircraft capable of carrying approximately 100 to 125 passengers at a cruising speed of approximately 1,300 miles per hour (twice the speed of sound). It can cruise at altitudes ranging from 50,000 to 60,000 feet.

One of the unavoidable adverse environmental effects of the Concorde is noise pollution.

Following are three perspectives of the Concorde.



Source: FAA September 1975 Final Environmental Impact Statement.

EFFECTS OF AIRCRAFT NOISE

Aircraft noise is and will continue to be a serious problem for some 6 to 7 million Americans. In the late 1960s the Congress recognized that aircraft noise was a major hindrance to further development of the commercial aircraft industry and gave the Federal Aviation Administration (FAA) responsibility to regulate aircraft design and equipment to reduce noise.

Aircraft noise reduces the quality of life by interfering with speech and disturbing sleep and relaxation. Recently, a number of homeowners have successfully sued airport proprietors for nuisance and diminishing property values. In the last 5 years, airport proprietors have paid over \$25 million in legal judgments or settlements in noise-related suits and have spent over \$3 million in legal fees, expert testimony, and similar defense efforts. Some airport proprietors have acquired substantial residential areas near their boundaries. Los Angeles International Airport, for example, has spent over \$130 million to purchase private residences and plans to spend \$21 million to soundproof schools and other public buildings near the airport.

SCOPE OF REVIEW

In response to the Chairman's request, we examined the Concorde noise-monitoring system at Dulles International Airport, analyzed citizen's complaints at Dulles, reviewed Concorde noise-monitoring reports prepared by FAA, analyzed the public opinion poll on the Concorde, reviewed the noise abatement proposals proposed to the Port Authority of New York and New Jersey, and compared the Concorde noise levels with subsonic aircraft.

Although our request dealt only with the Concorde's noise aspects, decisions affecting this aircraft also have important implications for our economy and international relations.

We held discussions with officials from the Department of Transportation (DOT), Environmental Protection Agency (EPA), FAA, and the National Aeronautics and Space Administration (NASA) in Washington, D.C., and at EPA and FAA regional offices in New York. We also met with officials of the Port Authority of New York and New Jersey. We examined documents, reports, and records from the agencies contacted.

CHAPTER 2

THE CONCORDE IN THE UNITED STATES

-- A CHRONOLOGY OF EVENTS

Since the initial application to fly the Concorde in the United States by the British and French the Concorde has faced many legal and administrative hurdles.

The Secretary of Transportation established a 16-month test flight period at Dulles and John F. Kennedy International Airports to gather data necessary for determining whether the Concorde should be allowed to operate permanently in the United States. The Concorde has been landing at Dulles (a Government-owned airport) since May 24, 1976. However, the Port Authority of New York and New Jersey (the operator of Kennedy) temporarily banned the Concorde from landing at Kennedy. The British and French airlines filed suit against the Port Authority to invalidate the ban. Although there have been decisions, subsequent reversals, and later appeals, the legal issues have not yet been resolved.

EARLY HISTORY

The development of a commercial supersonic aircraft (SST) goes back to the mid-1950s. It was not until the mid-1960s, however, that the Concorde began affecting the United States. In July 1965 the British and French aircraft manufacturers applied to the FAA for a U.S. "type certificate" (certification that the aircraft meets design, safety, and other FAA requirements).

Airworthiness and other studies necessary before issuing a type certificate were started by FAA but subsequently shelved because at that time no U.S. air carriers had indicated intentions to purchase or operate the Concorde. Although the French and British aviation authorities subsequently certified the Concorde as airworthy, a U.S. air carrier cannot own or operate a Concorde unless a type certification is issued by FAA. As of August 31, 1977, no final action had been taken by FAA to issue a type certificate for the Concorde.

The first Concorde test flight was made in March 1969 and the Concorde was subsequently placed in regular commercial service in Britain and France in January 1976.

In the summer of 1974 the British and French governments informally advised the FAA of their intention to

place the Concorde into regular service in the United States in early 1976. Based on this information, the FAA began preparing an environmental impact statement on the Concorde. In February 1975 Air France and British Airways officially requested that their U.S. operations specifications be amended. Formal application was made August 29, 1975 by British Airways and September 21, 1975 by Air France for a specified number of flights to Dulles and Kennedy airports.

Applications for amendments to operations specifications must be approved and issued by FAA before a foreign carrier can change commercial service to and from the United States. Operating specifications include (1) a list of the aircraft type to be flown, (2) airports to be served, and (3) routes and flight procedures to be followed.

The FAA draft environmental impact statement was made available to the public on March 3, 1975. Public hearings were held in Washington, D.C.; New York City, New York; and Sterling Park, Virginia. In addition to testimony received at the hearing, about 3,000 written comments were received; about 60 of these favored the proposed operations while approximately 2,900 objected.

The final environmental impact statement--completed in September 1975--described the probable environmental effects of Concorde operations and listed the following four alternative courses of action:

- Refuse to amend the operations specifications of Air France and British Airways.
- Amend the Air France and British Airways operations specifications as requested.
- Impose additional restrictions on British Airways and Air France Concorde operations.
- Take no action. This was not considered a viable alternative by FAA.

According to the environmental impact statement, noise is one of the unavoidable adverse environmental effects of the Concorde. Although Concorde noise is present in high-frequency bands similar to subsonic aircraft, it also produces relatively more low-frequency noise that increases annoyance because it vibrates structures near airports. The Concorde's perceived loudness under the takeoff flight path was stated to be double that of a Boeing 707 and four

times that of a Boeing 747. The Concorde's low-frequency noise level, however, was projected as five times that of present subsonic jet aircraft.

In order to obtain additional views before deciding on the application for limited Concorde service in the United States, the Secretary of Transportation called for additional public hearings to be held on January 5, 1976, at which he presided. Testimony was presented by various U.S. Federal agencies, citizen groups, Concorde manufacturers, British Airways and Air France, experts in technology and environment, and British and French Government officials.

EPA testimony presented at this hearing stated the issue was one of

"*** whether the benefits of reducing the flight time across the Atlantic for a relatively small number of people and of avoiding possible offense to our allies [the British and French] are worth the cost which must be borne by the citizens of this country."

EPA concluded that:

- The introduction of Concorde service runs directly counter to the noise abatement and other U.S. environmental policies and programs.
- Approval of limited Concorde operations would likely lead the way for additional British and French Concorde flights or requests by other airlines for Concorde approvals.
- Reductions in travel time and promotion of technology to be gained by Concorde approvals would not justify the significant environmental effects involved.

Accordingly, EPA recommended that the applications for Concorde SST flights to John F. Kennedy International Airport and Dulles International Airport should be denied. About one week later, on January 13, 1976, EPA submitted a proposed regulation to the FAA which, if implemented, would have effectively banned the Concorde.

ENTRY INTO THE UNITED STATES

Based on the environmental impact statement, public hearings, and other written materials submitted for the record, the Secretary of Transportation, on February 4, 1976, authorized British Airways and Air France to make

limited scheduled commercial Concorde flights into the United States for a period not to exceed 16 months, subject to certain limitations and restrictions. Each carrier was permitted to make up to two flights per day into John F. Kennedy Airport and one flight per day into Dulles International Airport. Other restrictions and limitations included:

- No flight could be scheduled for landing or takeoff in the United States before 7 a.m. local time or after 10 p.m. local time.
- Except where weather or other emergency conditions dictate, British Airways flights must originate from Heathrow Airport in London and Air France flights from Charles de Gaulle Airport in Paris.
- Authorization of any commercial flights in addition to those permitted by the decision would require a new environmental impact statement.
- In accordance with existing FAA regulations, the Concorde could not fly over the United States at supersonic speeds.
- The FAA was authorized to impose additional noise abatement procedures to minimize noise effect.

The Secretary also ordered the FAA to set up monitoring programs at Kennedy and Dulles Airports and to report monitoring results to him monthly. The first 12 months of the test period were to be used for data collection and the last 4 months for data analysis.

The Secretary concluded in his decision that the adverse environmental impacts, including low-frequency noise vibrations, were not sufficient reasons for denying limited operations. The Secretary reasoned that:

"The information from the demonstration would enable us to determine whether the original Concorde should be permitted to operate into designated United States airports in accordance with specified operating procedures and restrictions; and it would also provide useful information in the review and evaluation of EPA's latest proposal for an SST noise standard ***"

The Secretary cited benefits of the trial period to be (1) an expression of international cooperation and good will between the United States and Britain and France, (2) possible technology advancement, (3) evaluation as to

whether the SST is commercially viable, and (4) to permit further assessment of environmental effects and to allow evaluation of subjective community response.

The Secretary also stated:

"The situation with respect to [Kennedy] may be complicated by the fact that under Federal policy that has hitherto prevailed a local airport proprietor has had authority under certain circumstances to refuse landing rights. If for any legitimate and legally binding reason it should turn out that the [Kennedy] part of the demonstration could not go forward--and no one has indicated to me any such final disposition by [Kennedy]'s proprietor--that would obviously be extremely unfortunate and would greatly diminish, but in my opinion it would not destroy the validity of the demonstration."

In a joint communication dated March 11, 1976, British Airways and Air France notified the Port Authority of their intention to schedule commercial Concorde flights at Kennedy beginning on or about April 10, 1976. On the same date as the communication, the Board of Commissioners of the Port Authority adopted a resolution banning supersonic transport operations at Kennedy until after at least 6 months of operating experience at Dulles had been evaluated. The commissioners expressed concern over the higher Concorde noise levels and structural vibrations as compared to subsonic aircraft.

On March 17, 1976, 6 days after the Port Authority temporarily banned Concorde operations at Kennedy, British Airways and Air France filed suit in U.S. District Court for the Southern District of New York to invalidate the Port Authority ban. The airlines claimed that the Port Authority's action invades an area preempted by the Federal Government and violates international commitments made by the United States to the British and French Governments.

In response to the Secretary's decision, FAA issued on April 2, 1976, an order provisionally amending the operations specifications of British Airways and Air France, and the first flights into Dulles took place on May 24, 1976.

On April 23, 1976, the Port Authority retained the consulting services of the Stanford Research Institute, and its director, Dr. Karl Kryter, as its noise consultant. The Institute was directed to analyze the noise and vibrations produced by the Concorde as compared to

subsonic aircraft at Dulles, Heathrow, and Charles de Gaulle airports.

In August 1976 the Port Authority learned that the British did not plan to survey the attitudes of the Heathrow Airport community on the Concorde and subsequently retained Dr. A.C. McKennell, a British social psychologist, to conduct an attitude survey around Heathrow Airport. The McKennell study was completed in March 1977, and two conclusions reached were:

"Concorde is found to differ from subsonic aircraft in that vibration effects are almost as important as speech interference as a source of disturbance."

"Heathrow residents perceive Concorde along with the VC10 and the Trident as the three most annoying and disturbing among the types of aircraft that they hear. This is so even though mentions of Concorde are depressed for the total sample by the degree of patriotic involvement with the plane. Among that segment of the sample that is less biased in this respect, and therefore more comparable to the Kennedy population, Concorde is seen as more annoying and disturbing than the VC10 and the Trident."

The consultant reached no conclusion on whether the Concorde substantially added to overall aircraft noise annoyance in the Heathrow area.

PROPOSED NOISE ABATEMENT PROCEDURES

To meet the Port Authority's noise standard, British and French representatives submitted to the Port Authority officials, on April 1, 1977, proposed noise abatement procedures that would be used if Concorde were allowed to land at Kennedy. The proposal submitted by the airlines was designed to show how they intended to reduce noise in the communities surrounding Kennedy by using the various operational procedures described below.

Runway utilization

The airlines proposed to use certain runways at Kennedy so that aircraft noise over the surrounding communities would be minimized. Under the proposal, over 98 percent of the predicted Concorde takeoffs would be on runways with departures over the water--this would reduce the noise effect on residential areas. Only about 2 percent of aircraft operations would be on the runway

considered critical from the community noise aspect.

Takeoff procedures

The airlines proposed detailed takeoff maneuvers for each runway, utilizing specific banking and throttling techniques to minimize noise.

Less fuel required than originally planned

The airlines and manufacturers have acquired a thorough understanding of fuel requirements from the experience and analysis of operations at Dulles. They proposed to take off with approximately 23,000 pounds less fuel than previously expected. This is accomplished by reducing the fuel reserve. This allows the aircraft to climb faster and need less power, making takeoffs quieter.

Landing procedures

The airlines proposed that Concorde could land on any runway preferred by the Port Authority, subject to air traffic control requirements. Whenever practicable, higher speed would be maintained to minimize noise over the communities. This procedure, called a decelerating approach, is recognized as normal for the Concorde and, because it requires less thrust on approach, noise would be minimized for those living under the approach paths.

In addition, both Air France and British Airways proposed to cancel one of their regular subsonic flights per day from their New York schedule.

The Port Authority, on April 5, 1977, asked the British and French to obtain an FAA evaluation of the various proposed procedures. The FAA performed a technical assessment of the proposals and, in its April 14, 1977, reply, stated that "*** we believe your analysis is technically sound; if the assumptions it is based upon are borne out in practice, the noise reduction *** would be realized."

COURT RULINGS

In response to a court order the FAA prepared a draft environmental impact statement in April 1977 that considered the probable environmental impacts that would occur if the present Concorde were allowed to operate at 12 major U.S. airports selected on the basis of their ability to support relatively high-cost SST air travel and offer suitable routes to world business centers. The draft statement

considered the following administrative actions, but proposed no specific action:

- Promulgation of a noise certification rule applicable to current and/or future SSTs.
- Promulgation of operational regulations for SSTs.
- Issuance or nonissuance of a U.S. certificate for the Concorde.
- Granting or denying of operations specifications amendment requests for SSTs.
- Promulgation of airport noise regulations.
- No Federal action.

Much of the noise information in this draft was the same as that contained in the September 1975 final environmental impact statement on the Concorde. This statement contained no conclusions or specific rulemaking recommendations. In its July 14, 1977, reply commenting on the draft, EPA stated that

"*** it is EPA's opinion that the [Environmental Impact Statement] is inadequate for decision-making purposes. We believe a revised [Environmental Impact Statement] or supplement thereto should be prepared. The [Environmental Impact Statement] as drafted contains:

- a. no actual rulemaking proposals;
- b. no analysis of the fundamental policy issues upon which these proposals should be based; and
- c. no evaluation of the bulk of the generic alternatives that are presented."

EPA also recommends that the FAA promulgate the two SST noise rules previously proposed by EPA which would:

- a. effectively ban all but a few of the initial version Concorde (those with flight time before December 31, 1974);
- b. require later production or derived versions to comply with the 1969 FAR 36 requirements; and
- c. require new type designs of supersonic trans-

ports to meet the FAR 36 requirements which are in effect for subsonic aircraft when the application for the new type certificate is submitted."

More than a year after the suit had been filed against the Port Authority in the U.S. District Court, the court ruled on May 11, 1977, that the Port Authority's temporary ban on Concorde operations at Kennedy was unlawful. The Court found that this regulation area (control of air traffic) has generally been preempted by the Federal Government. The Court held that the ban was in direct conflict with the Secretary of Transportation's decision authorizing the Concorde flights and was therefore invalid under the Constitution's supremacy clause.

On May 20, 1977, the Port Authority appealed the District Court's ruling, and on June 14 the U.S. Court of Appeals reversed the lower court's decision. The Court of Appeals decision states that the Congress provided for the promulgation of reasonable regulations by airport operators to establish acceptable noise levels for an airport and their surrounding areas.

In its amicus (friend of the court) brief on the appeal, the United States stated that its policy was still not to preempt airport operator's authority and for the first time questioned the reasonableness of the Port Authority's Concorde ban. Since the Court of Appeals could not appropriately decide the issue, it directed the District Court to hold a hearing to review the reasonableness of the Port Authority's ban.

On July 12, 1977, the Appeals Court-directed evidentiary hearing was held in the U.S. District Court. On the day preceding the hearing the District Court judge stated that his role was to take evidentiary proof on whether the Port Authority carried out its responsibility for controlling permissible noise levels around airports in a fair, reasonable, and nondiscriminating manner. At the hearing, the Port Authority stated that it believed the Concorde could meet the standard for maximum noise on takeoff but that the ban had been continued because the Concorde produced low-frequency energy or vibrations.

By letters dated July 29, 1977, the Port Authority requested that DOT and NASA perform additional studies of vibrations produced by the Concorde. One purpose of these studies would be to quantify the annoyance from these vibrations so that standards could be established. Copies of these letters were sent to several Congressmen.

Subsequently, on August 4, 1977, we were asked by 17 Congressmen to coordinate and monitor efforts between NASA, the Port Authority, and DOT in their attempts to promulgate a standard for the Concorde's low-frequency vibration and rattle effect.

In a meeting convened by us on August 16, 1977, among representatives of DOT/FAA, EPA, NASA, and the Port Authority, each agency agreed to review the low-frequency noise studies prepared by the Port Authority's consultant and decide what each could usefully do to develop a low-frequency vibration index, if such an index is needed. The agency responses are due by September 16, 1977.

On August 17, 1977, the District Court judge ruled that the Port Authority's ban on Concorde operations at Kennedy was discriminatory, arbitrary, and unreasonable, and deprived the Concorde of an opportunity to show that it is environmentally acceptable at that airport. The Court concluded that the Port Authority "***has no intention of taking the responsibility of setting the present or another noise standard applicable to the Concorde." Subsequent court action ordered the ban lifted effective August 30, 1977, and gave the Port Authority until that date to file any appeal. The Port Authority served notice that it intends to appeal the District Court's decision and the effective date for lifting the ban was extended to September 19, 1977.

CHAPTER 3

U.S. NOISE REGULATIONS AFFECTING AIRCRAFT

To afford present and future relief and protection to the public from unnecessary aircraft noise and sonic boom, the Congress in 1968 amended the Federal Aviation Act of 1958 by adding a new section entitled "Control and Abatement of Aircraft Noise and Sonic Boom."

Aviation regulatory authority rests primarily with FAA. However, EPA also plays a significant role in the aviation regulatory process in that, under the Noise Control Act of 1972, EPA was required to submit recommendations for regulations to FAA that EPA deemed necessary to protect the public health and welfare.

Following is a chronology of the regulations or actions that are presently in effect or have been proposed that affect the Concorde.

Part 36 of the Federal Aviation Regulations (F.A.R.-36) "Noise Standards: Aircraft Type Certification" became effective December 1, 1969. These regulations prescribed noise measurement, noise evaluations, and noise level requirements for the issuance of type certificates and changes to these certificates for subsonic aircraft. They were not, however, applicable to supersonic aircraft. This regulation initiated the Government's aviation noise abatement regulatory program.

On April 10, 1970, FAA published a Notice of Proposed Rulemaking 70-16 "Civil Aircraft Sonic Boom". This standard became effective April 27, 1973, as F.A.R.-91.55, and prohibited commercial supersonic aircraft from flying over the continental United States at supersonic speeds (creating a sonic boom).

In August 1970 the FAA published in the Federal Register an Advanced Notice of Proposed Rulemaking (A.N.P.R.M. 70-33) on "Civil Supersonic Aircraft Noise Type Certification Standards." FAA issued an advance notice because it believed it would prove helpful to invite early public participation in the identification and selection of tentative or alternate courses of action upon which a rulemaking procedure might be undertaken. No proposals for specific rules or regulations were included in the advance notice and, as of August 31, 1977, no final SST noise standards have been developed from it.

In response to the requirements of the Noise Control Act of 1972, EPA prepared and issued a report on aircraft/airport noise in August 1973. The report included discussions on the adequacy of noise emission standards on new and existing aircraft and made recommendations on the retrofitting and/or phaseout of existing aircraft that could not meet noise standards.

The report stated the Concorde's noise

"...is not capable of being controlled by available technology to levels as low as the criteria of FAR 36. Therefore, the Agency will take this into account in proposing regulations to the FAA regarding SST noise control to protect public health and welfare. Future SST aircraft types should at least be regulated to noise levels conforming to the original FAR 36 levels. As more advanced noise control technology becomes available, limits should be reduced accordingly."

Subsequently, on February 27, 1975, EPA submitted to FAA a proposed noise standard for SSTs. This was published by FAA on March 28, 1975, as a Notice of Proposed Rulemaking 75-15, "Civil Supersonic Airplanes." EPA concluded that there was no technology currently available that would allow controlling the Concorde's noise emissions to the noise levels prescribed for subsonic aircraft under F.A.R.-36. The proposed rule set forth appropriate F.A.R.-36 noise requirements for future new design of SSTs and proposed an operating rule that would require future production of current SST types to meet F.A.R.-36 noise standards.

No specific rule was proposed for SSTs already produced or committed to production. Instead, EPA reviewed eight possible options for FAA to consider ranging from outright ban to complete lack of control. EPA favored an option whereby individual airports with minimal population noise effects would be considered case by case by FAA, with additional review and approval by the airport operators. No specific airports were identified by EPA. No final SST aircraft noise standards have been developed from this proposed rule.

EPA submitted another SST noise proposal to FAA on January 13, 1976. This was subsequently published by FAA on February 12, 1976, as Notice of Proposed Rulemaking 76-1, "Airplane Noise Requirements for Operation To or From U.S. Airports". The basic principle presented in this proposal

was that all aircraft be required to conform to F.A.R.-36 noise levels to be allowed to operate at U.S. airports. This proposed rule would have effectively banned the Concorde since it cannot feasibly comply with F.A.R.-36 standards. No final SST aircraft noise standards have been developed from this proposal.

In response to an EPA request that FAA expedite action on EPA SST noise proposals, the FAA replied in September 1976 that it would be inappropriate to proceed with a final rule until the end of the 16-month Concorde trial. In Congressional testimony in June 1977 the Secretary of Transportation stated that FAA would publish a proposed SST noise standard around September 1, 1977. FAA has prepared a notice of proposed rulemaking concerning SSTs and is expected to issue it in the near future. Although we have attempted to obtain a copy, to date it has not been provided for our analysis.

In a major policy statement issued November 18, 1976, the DOT/FAA expressed its views on what actions should be taken in a national effort to reduce aircraft noise. It clarified the Government's responsibilities in reducing aircraft noise at its source and in promoting safe operational procedures that abate the effect of noise on populated areas. The Federal action plan as outlined in the policy statement consisted of (1) requiring compliance by currently operating aircraft with applicable noise standards; (2) developing more stringent noise standards for future design aircraft; (3) developing aircraft operating procedures that are designed to abate noise; (4) providing additional financial assistance to airports for land acquisition to assure compatible land use near airports; and (5) assisting airport proprietors in the development of aggressive noise abatement programs for their airports.

In discussing supersonic aircraft, the policy stated that the FAA

"***will act to promulgate a noise rule applicable to supersonic aircraft that is necessary to protect the public health and welfare and that is consistent with the statutory requirement that the Administrator consider technological practicability, economic reasonableness, and appropriateness to aircraft type."

These technological, economic, and appropriateness tests are required by Section 611 of the Federal Aviation Act of 1958, as amended in 1968 and 1972.

CHAPTER 4

THE CONCORDE NOISE-MONITORING PROGRAM

To determine the subjective community reaction to the actual Concorde operations at Dulles, the FAA conducted three separate phases of community response monitoring: (1) community opinion surveys, (2) monitoring of complaints about Concorde, and (3) media content analysis.

Our analysis of the monitoring of community response to Concorde at Dulles has shown the following:

- The community opinion surveys at Dulles have not achieved the original objectives of determining the community awareness of Concorde noise and whether these attitudes change as a result of actual Concorde operations.
- Although the Concorde represents a very small percent of operations in and out of Dulles (.3 percent), complaints about Concorde are significantly higher (proportionally) than for conventional subsonic aircraft.
- Based on our review of FAA's contractor's media content analysis as well as FAA's draft report on the community response to Concorde, we agree that the Concorde is perceived as both a local and a national issue. The media analysis showed that negative reaction toward the Concorde trial significantly outnumbered positive reactions. Based on an analysis of complaints about Concorde with media coverage, it can be concluded that Concorde complaints largely resulted from actual exposure rather than influences such as newspapers, magazines or television.

The Secretary of Transportation's decision permitting a 16-month trial for the Concorde stated:

"The most serious immediate consequence of limited Concorde operations is noise. The Concorde is noisier than the subsonic jets, particularly on takeoff, although the limited flights under consideration will have a negligible impact on total aircraft noise exposure at Dulles and only a marginally incremental impact at JFK. But at a time of heightened environmental consciousness, any additional noise is a serious adverse consequence. The unique characteristics of Concorde noise and the publicity that has surrounded its advent may well aggravate the community's response to this source

of noise. This subjective characteristic of noise response may best be evaluated through a controlled demonstration period of sufficient length to enable an assessment, after the initial publicity has subsided, of community reaction to Concorde noise. A demonstration will also enable additional testing at various measuring points to supplement the data contained in the EIS. The information from this demonstration will enable us to determine whether these original Concordes should be permitted to operate into designated United States airports in accordance with specified operating procedures and restrictions."

The Secretary directed FAA to monitor and assess the noise and air quality effects of Concorde operations at both Dulles and Kennedy Airports. The Office of the Secretary of DOT, EPA, and NASA worked with FAA in the development of a monitoring test plan, consisting of the following elements:

- Noise and emissions monitoring at Dulles and surrounding communities.
- Structural vibration recording at Sully Plantation (a local historic site) to determine the effects (if any) of the low-frequency noise from Concorde. Additional structures were tested during the trial.
- Placement of sonic boom recorders along the East coast to determine the occurrence of any sonic booms from Concorde.
- Monitoring of citizen complaints received about Concorde operations.
- Community response obtained by a series of telephone interviews with residents in the area surrounding Dulles.
- Data reported monthly to the public.
- Final report to compare measured effects to those published in the environmental impact statement.

The main purpose for monitoring Concorde operations was to provide the DOT Secretary with technical, operational, and community response information that would assist in determining whether the Concorde should be

allowed to operate in the United States on a permanent basis. According to an FAA official, about \$1.3 million has been allocated for the Concorde monitoring system.

PHYSICAL MONITORING SYSTEM

The FAA Concorde noise-monitoring system at Dulles consists of both mobile and fixed monitors. The mobile portion is composed of five contained systems, of which four are used routinely and one is used as a spare. The mobile systems were staffed by FAA-trained college students.

The fixed noise-monitoring system consists of eight self-contained all-weather enclosures, each equipped with instruments to provide

- a statistical description of environmental noise for selected time periods,
- a continuous decibel time history of environmental noise, and
- a magnetic tape recording of selected aircraft noise events through use of a remote radio switching system.

The system was serviced about every 2 days by FAA-trained college students.

The physical equipment also included a noise data-reduction system that shared the FAA's permanent noise-monitoring system computer located at Dulles. This system was used for further analysis of the noise-monitoring data gathered during the trial.

Although we did not evaluate the technical quality or reliability of the physical noise-monitoring system, officials from DOT, EPA, and NASA all described the system as excellent and believe the system data could be considered accurate.

During the year of Concorde operations (May 1976 through May 1977) the noise levels recorded closely approximated those projected in the September 1975 final environmental impact statement. On takeoff the Concorde's actual effective perceived noise level in decibels (EPNdB) directly over the monitor at 3.5 nautical miles, averaged 119.4 as compared to the environmental impact statement estimate of 119.5 EPNdB. On landing the Concorde's actual EPNdB averaged 116.5, as compared to an estimate of 116.5 EPNdB. It should be noted, however, that while the actual

Concorde noise levels closely approximate environmental impact statement estimates they are still far over noise standards for supersonic aircraft, which for a subsonic aircraft of 400,000 pounds gross weight would be 106.8 EPNdB at the approach site and 105.1 EPNdB at takeoff.

COMMUNITY OPINION SURVEY

The community opinion survey consisted of three separate series of telephone interviews of residents near Dulles. The surveys were held at three points in time, once before the start of operation, once after approximately 6 months of exposure, and once after a year of operation. The first survey was to be used as baseline data to measure the amount of any change in community attitudes because of subsequent Concorde operations.

To design a procedure to effectively measure public opinion about the Concorde, a steering group was formed to provide FAA with a broad spectrum of advice based on the expertise and special interests of the group members. The members included representatives from DOT, EPA, NASA, the Fairfax County Planning Office, the Metropolitan Washington Council of Governments, the Virginia Council on the Environment, the Virginia Division of Aeronautics, and the Virginia State Air Pollution Control Board. In addition, assistance on questionnaire and survey designs was sought from a group of social survey and psychoacoustic experts.

A sampling plan was developed for the Dulles area that divided respondents into four noise impact groups: high, moderate, light, and currently unimpacted. A total of 550 respondents was selected within each impact group. According to FAA, it was decided to conduct interviews by telephone because the time available before the start of Concorde operations was extremely short, and this method was also less costly than other interviewing techniques.

The FAA draft report on the community response monitoring program stated that interviews were conducted by a "trained cadre of interviewers." The three surveys were conducted during the following time intervals:

<u>Survey</u>	<u>Dates</u>
I	May 19-23, 1976
II	Dec. 7-21, 1976
III	May 11-31, 1977

The following table shows the actual number of respondents by impact area in each survey:

	<u>I</u>	<u>II</u>	<u>III</u>
High	443 (22%)	368 (22%)	397 (24%)
Moderate	669 (33%)	406 (25%)	365 (22%)
Light	379 (19%)	419 (26%)	439 (27%)
Unimpacted	<u>535 (26%)</u>	<u>437 (27%)</u>	<u>434 (27%)</u>
Total	<u>2,026 (100%)</u>	<u>1,630 (100%)</u>	<u>1,635 (100%)</u>

Our analysis of the community opinion survey disclosed serious weakness in the sampling plan, questionnaire design, interviewing technique, and processing of the actual response data. Consequently, we believe the results of the community opinion surveys are questionable.

Sampling plan

Since the respondents in each survey were drawn from those listed in the telephone directory, it did not include those individuals and families (a) without telephones, (b) with unlisted numbers, (c) with numbers not in the directory but available from information operators, and (d) with telephones temporarily out of order. According to telephone company officials, approximately 15 to 18 percent of current households surrounding Dulles are in these categories.

Furthermore, we could find no evidence that an effort was made to determine if the characteristics of this excluded group or of that group of persons that was called but did not complete an interview (23 percent of all those called in survey II did not complete an interview) differ from the characteristics of persons that did complete an interview. Thus, FAA does not know if those published telephone subscribers sampled accurately reflect the total population of the areas concerned.

In addition, an undetermined amount of telephone numbers were added to the moderately impacted area sample during the first survey. This uncontrolled substitution of telephone numbers means that the sample was not equally distributed by noise impact area. Likewise, the proportions of telephone numbers for each community within each impact area do not represent the proportion of telephones in the communities. Thus, the moderately impacted area was relatively oversampled while the other noise impact areas were relatively undersampled. This limits the reliability of any generalizations about the sample as a whole.

Questionnaire design

The questionnaire also had design problems with the wording of questions that were to provide information on the "subjective responses to Concorde during actual operations." Because these questions failed to distinguish between the Secretary's decision, the 16-month test, limited Concorde operations, unlimited Concorde operations, and the Concorde aircraft itself, the survey data will not reliably provide the desired information.

The importance of the failure to distinguish between these different concepts can be seen by reviewing those questions (reproduced below) that directly concern Concorde.

12. What do you think of Secretary Coleman's decision to allow Concorde to conduct limited operations at Dulles and JFK Airports? Do you:
 1. approve strongly
 2. approve somewhat
 3. disapprove somewhat
 4. disapprove strongly
 5. have no opinion
13. Have you heard the Concorde since it began operations at Dulles Airport?
 1. Yes
 2. No (skip to Question 15)
14. Has this changed your view of the Concorde or made no difference?
 1. Changed
 - a. toward approval
 - b. toward disapproval
 2. Made no difference (skip to Question 15)

Question 12 asks respondents their opinion of the Secretary's decision. It does not ask for their subjective response to limited operations, although this is the information that was originally sought by the Secretary.

Furthermore, it does not ask for their opinion of expanded Concorde operations although a greater number of operations may be quite likely if Concorde operations are eventually approved.

Question 13 is straightforward, but question 14 asks if the respondents' view of the Concorde has changed. But does "view of the Concorde" request respondents' subjective opinions of a foreign-built supersonic aircraft or is the question requesting opinions on the noise of limited Concorde operations? This latter interpretation can easily be implied since question 13 asks if the respondent has heard the Concorde.

It is also possible that respondents could interpret question 14 as a request for their possible change in opinion toward the Secretary's decision, since this opinion was sought in question 12. Since the respondents could have legitimately answered question 14 differently (depending on which way they interpreted the question's wording) we believe that it is difficult to determine what the responses to questions about noise and Concorde actually mean.

The structure and wording of several other questions contain a negative bias that may influence responses. The inclusion of separate questions on aircraft pollution and the use of the terms "bothersome" and "annoyed" give a negative emphasis to the subject. Other questions emphasize the negative aspects of aircraft noise despite the fact that the respondent may not be annoyed by aircraft noise. A neutral approach would have been less likely to influence responses.

Telephone interviews

The telephone interviews were conducted primarily by college students, members of a local woman's club, and other local individuals. The interviewers were provided with only a 2-1/2 hour training session, a brief instruction manual, and were not supervised to be sure that the questions were asked and recorded uniformly. We could not determine if the interviewers were screened for potential bias. In addition, the interviewers were not instructed to guarantee the respondents' confidentiality or anonymity. Such guarantees help in obtaining valid and reliable responses and usually increase the response rate.

Further, it appears the timing of the first survey in May 1976 may have biased the responses. Just before and during the survey there was extensive publicity about the Concorde--including a Concorde pre-test period landing and

takeoff at Dulles--because of a visit by the French President. This publicity may have produced bias by increasing the respondent's awareness of aircraft noise or otherwise affecting answers. Also, the second survey was held in December, when people are indoors with windows closed. Thus, because people may be less likely to notice aircraft noise in December than in May, the results of survey II are not really comparable to survey I.

Coding and processing of the questionnaire responses

Neither the survey contractor nor the FAA project office has retained documentation of the control procedures used to code and process completed questionnaires. Accordingly, we cannot comment fully on their adequacy. In addition, the completed questionnaires we examined were not marked or identified by noise impact area or community, therefore, we could not determine if they were coded and keypunched accurately.

The contractor's report of results does not always distinguish between no opinion and no response. Since some "no opinion" may be falsely counted as "no response", a distinction between them should have been made.

COMPLAINT MONITORING

The complaint monitoring phase was a mechanism by which the public could express its views about Concorde operations at its convenience. An existing telephone number at Dulles, the "Sound Complaint Center," was publicized as the number to call to voice complaints about Concorde operations. To maintain continuity by using a known telephone number and to provide assurances that complaints were being collected impartially, a private contractor was hired to answer the telephone and record complaints.

The aircraft noise exposure to communities around Dulles is relatively light. Consequently, complaints about such noise at Dulles in the past were not too significant. For example, in the 3-year period prior to Concorde operations, only 77 complaints were recorded at the complaint center.

From May 24, 1976, to May 31, 1977, 1,387 calls about the Concorde were received by the "Sound Complaint Center" at Dulles; this averages to about 2-1/4 complaints per Concorde operation. It should be noted that during this same period 375 complaints about noise from aircraft other

than Concorde were also recorded. The following table shows the 1,387 Concorde complaints by each month:

<u>Month</u>	<u>Number of Complaints</u>
May 1976	53
June	85
July	68
August	115
September	187
October	101
November	95
December	91
January 1977	65
February	90
March	128
April	129
May	<u>180</u>
Total	<u>1,387</u>

The complaints were recorded by the contractor, analyzed, and included in the monthly monitoring reports prepared by FAA for public release. We randomly selected 4 months of FAA complaint data for detailed analysis. Based on this analysis we believe the complaints have been accurately recorded and categorized and that the complaint data in the monthly reports are reliable.

An analysis of the Concorde complaints showed that the great majority (77 percent) concerned departure noise versus approach noise (23 percent). Since the Concorde is considerably louder on takeoff than conventional subsonic jet aircraft this is consistent with its noise characteristics.

Although there were 1,387 separate complaints about Concorde noise, many individuals complained about more than one adverse effect. Aggregate complaints numbered 2,038. Using this number as a base, the following percentages in the seven major categories developed by FAA were:

<u>Category</u>	<u>Percent of Complaints</u>
Excessive noise	56
Structure disturbance (e.g. building vibration)	23
Activity interruption (e.g. interference with TV viewing)	3
Perceived danger (e.g. fear of crash)	1
Animal disturbance (e.g. frightening farm animals)	3
Flying too low	8
Other (e.g. causing ear pain or illness)	6
	<hr/>
Total	<u>100%</u>

The above data clearly show that the greatest number of complaints concerned excessive noise and structural vibration.

As stated in chapter 2, some concern has been expressed about the low-frequency content of Concorde noise.

The data shown above indicate complaints about Concorde vibration noise totaled about 23 percent. The majority of disturbances mentioned by complainants were house shaking, window rattling, dish rattling, picture shaking, and shelve rattling, in that order.

Fewer complaints were received during cold-weather months than warm months, which suggests a seasonal effect on complaints. (See schedule on p. 24.) Since people spend more time indoors with the windows and doors closed during cold weather, a seasonal variation of complaints is to be expected. The number of vibration complaints increased significantly in winter months (when people spend more time indoors and are more likely to notice vibrations resulting from noise). For example, vibration complaints for the 4 winter months (December 1976 through March 1977) in the trial accounted for about 42 percent of all complaints during those months, as compared to 27 percent during the rest of the trial period.

MEDIA CONTENT ANALYSIS

The media content analysis monitored the quantity and characteristics of Concorde information available to the public through the media during the Concorde trial period. FAA believed this analysis could be used as an indirect assessment of public reaction to the Concorde trial. Sixteen national and local media outlets were selected as follows: four major newspapers, three national television network news stations, two local television news stations, and seven magazines.

FAA hired a contractor to monitor and analyze the quantity and characteristics of information available to the public by the media during the Concorde trial. FAA felt that the information obtained from this media analysis would indirectly assess the public reaction to the Concorde trial, and would determine whether the Concorde produced only a short flurry of media interest or a longer continuing interest.

The following 16 media outlets were monitored:

- | | |
|------------------------------|--|
| (1) Washington Post | (9) WTOP, Washington News |
| (2) New York Times | (10) Business Week Magazine |
| (3) Chicago Tribune | (11) Aviation Week Magazine |
| (4) Los Angeles Times | (12) Newsweek Magazine |
| (5) ABC Network News | (13) Time Magazine |
| (6) CBS Network News | (14) U.S. News and World Report Magazine |
| (7) NBC Network News | (15) Readers Digest Magazine |
| (8) WABC, New York City News | (16) New Times Magazine |

Concorde stories or articles were analyzed and classified by two major variables--(1) by importance of the story as assigned by the media and (2) by whether the story or article was positive, neutral, or negative.

The contractor's analysis of media coverage showed the following:

- The importance given Concorde stories indicate event-oriented coverage by all media.
- The Concorde was perceived as both a local and national issue.
- The Concorde was treated as a moderately important story in all media and media groupings.
- The media presented a more negative position about the Concorde trial than positive.

Another aspect examined in the media-content analysis was whether Concorde complaints might be related, at least in part, to media coverage. If this were true, then negative media coverage might cause community members to take action such as complaining. A time series analysis of the media data and complaint data was performed to test this possibility, but the conclusion reached in the FAA's draft report on community response monitoring stated: "Concorde complaints largely resulted from actual exposure to Concorde rather than from other, less direct, influences."

LOW-FREQUENCY VIBRATIONS

In his decision to permit a Concorde trial period, the Secretary concluded that the Concorde vibration characteristics were not a serious objection to commencing operations. Although the Concorde might produce as much as five times more low-frequency noise than most subsonic jets, DOT concluded that it would not cause structural damage and little possibility of annoyance.

As stated earlier, low-frequency vibrations were studied by NASA at Sully Plantation (near Dulles Airport) and at selected Maryland residences. The studies were conducted to assess the noise-induced building vibrations associated with Concorde operations. In a report summarizing the study results NASA concluded that:

- The vibration response of windows, walls, and floors appears to be directly proportional to the sound pressure level of the aircraft noise, and virtually independent of aircraft type.
- Concorde operations created higher noise levels and consequently, higher vibratory levels than subsonic jet aircraft.
- Certain household events such as closing doors and windows resulted in response levels equal to or higher than those associated with Concorde operations.
- Comparison of vibration measurements with structural damage and human perception criteria show the responses to be less than those expected to cause damage, but comparable to levels which are perceptible to people.

The Port Authority of New York and New Jersey, in its March 11, 1976, resolution temporarily banning Concorde operations at Kennedy stated that "the [September 1975] environmental impact statement and the Secretary's decision raise a number of significant questions concerning the effect of low-frequency noise" In correspondence with FAA, EPA expressed dissatisfaction with this segment of the monitoring program, stating that "the vibration program is of very limited scope." EPA also stated that

"of the physical data [being gathered] on the Concorde, it appears that the least amount of information is on the environmental impact of the SST low frequency emissions, especially vibration."

As of September 9, 1977, FAA's final report on the Dulles Concorde monitoring program had not been made available to us. We were given a draft copy of the community response portion, but it did not contain any conclusions or recommendations. Therefore, we do not know at this time what, if any, conclusions or recommendations have been made by FAA on the monitoring program results.

During the Concorde test, FAA also contracted with the National Academy of Sciences to review and assess the adequacy of FAA monitoring data and to assess the scientific adequacy of the data on community reactions at Dulles. Although attempts were made to obtain the Academy's draft report that was submitted to FAA, it was not made available to us. Therefore, we do not know what, if any, conclusions the Academy may have reached on the adequacy of the monitoring efforts.

CONCLUSIONS

We believe the public opinion surveys conducted at Dulles will not provide reliable information on the public response to the Concorde supersonic aircraft operation because problems were inherent to the survey's (1) sampling plan, (2) the questionnaire design and application, and (3) the response coding and processing. Because of these problems (and the resultant difficulty of interpreting the results) we question the validity of the community surveys and would not recommend using them in formulating policy on Concorde operations.

We believe, however, that the number of complaints received from individuals indicates a general negative response to the Concorde. The number of noise complaints received by the Sound Complaint Center at Dulles increased significantly during the Concorde trial. The number of complaints for conventional subsonic aircraft also increased from a previous 3-year total of 77 to 375 during the 1-year Concorde trial. This could be attributed to an increased public awareness of the Concorde and wider public awareness of the Dulles telephone complaint system.

The number and type of Concorde noise complaints are significant. Although Concorde operations accounted for less than one percent of the total Dulles operations, the 1,387 Concorde complaints represented 79 percent of total complaints.

Since the media content analysis concluded that the Concorde complaints resulted from actual Concorde exposure rather than from other less direct influences, and since the greatest percentage of Concorde complaints concerned takeoff--which is consistent with Concorde noise characteristics--the public response to Concorde at Dulles was valid. Although the number of Concorde operations was small, the number of complaints did not decrease as the trial continued and was significant enough to indicate a negative community response.

CHAPTER 5

HOW CONCORDE NOISE COMPARES WITH SUBSONIC

AIRCRAFT NOISE NOW AND IN THE FUTURE

The September 1975 environmental impact statement stated that the noise produced by the Concorde would be distinctive and readily identifiable. It was estimated that the perceived loudness or noisiness of the Concorde under the takeoff flight path would be double that of a Boeing 707, four times that of a Boeing 747, and eight times that of a McDonnell-Douglas DC-10. The results of the Concorde trial at Dulles have shown the estimates in the environmental impact statement to be accurate.

There is no known technology available that will silence the noise generated from the present Concorde supersonic aircraft. Consequently, it does not and cannot meet current Federal noise reduction standards for civil subsonic aircraft.

CURRENT NOISE LEVELS

Effective December 1, 1969, F.A.R.-36 put a ceiling on the noise levels of all newly certificated subsonic jet airplanes. A 1973 amendment to F.A.R.-36 required that all newly manufactured civil aircraft comply with the noise standards originally mandated for new aircraft design. An amendment effective October 1, 1977, makes F.A.R.-36 noise limits for newly certificated subsonic aircraft even more stringent. A 1976 regulation also requires that all subsonic aircraft, regardless of date of certification or manufacture, meet the initial F.A.R.-36 noise limits by 1985.

Following are comparisons of actual Concorde noise levels versus subsonic aircraft noise levels on departures and approaches from Dulles. This information was taken from DOT's May 1977 Concorde Monitoring Monthly Report and included actual data from the beginning of the Concorde trial through April 1977.

<u>Aircraft Type</u>	<u>Departure Noise Level (EPNdB)</u>	<u>Arrival Noise Level (EPNdB)</u>
Concorde	119.3	116.6
Boeing 727	104.3	107.7
Boeing 707	111.3	117.3
Boeing 747	108.2	115.0
DC-8	111.7	116.6
DC-9	101.3	109.0

Since the perceived loudness of any given sound doubles with each 10-decibel increase, the table above shows that the 119.3 EPNdB for the Concorde is about twice as loud as the 111.3 EPNdB for the Boeing 707.

It is therefore apparent that the Concorde is significantly noisier on takeoff than conventional subsonic aircraft. The differences in arrival noise levels for all aircraft however, are not as significant.

Although the Concorde is significantly noisier than subsonic aircraft, the following table shows that only about 21 percent of existing subsonic aircraft meet the 1969 F.A.R.-36 noise standards:

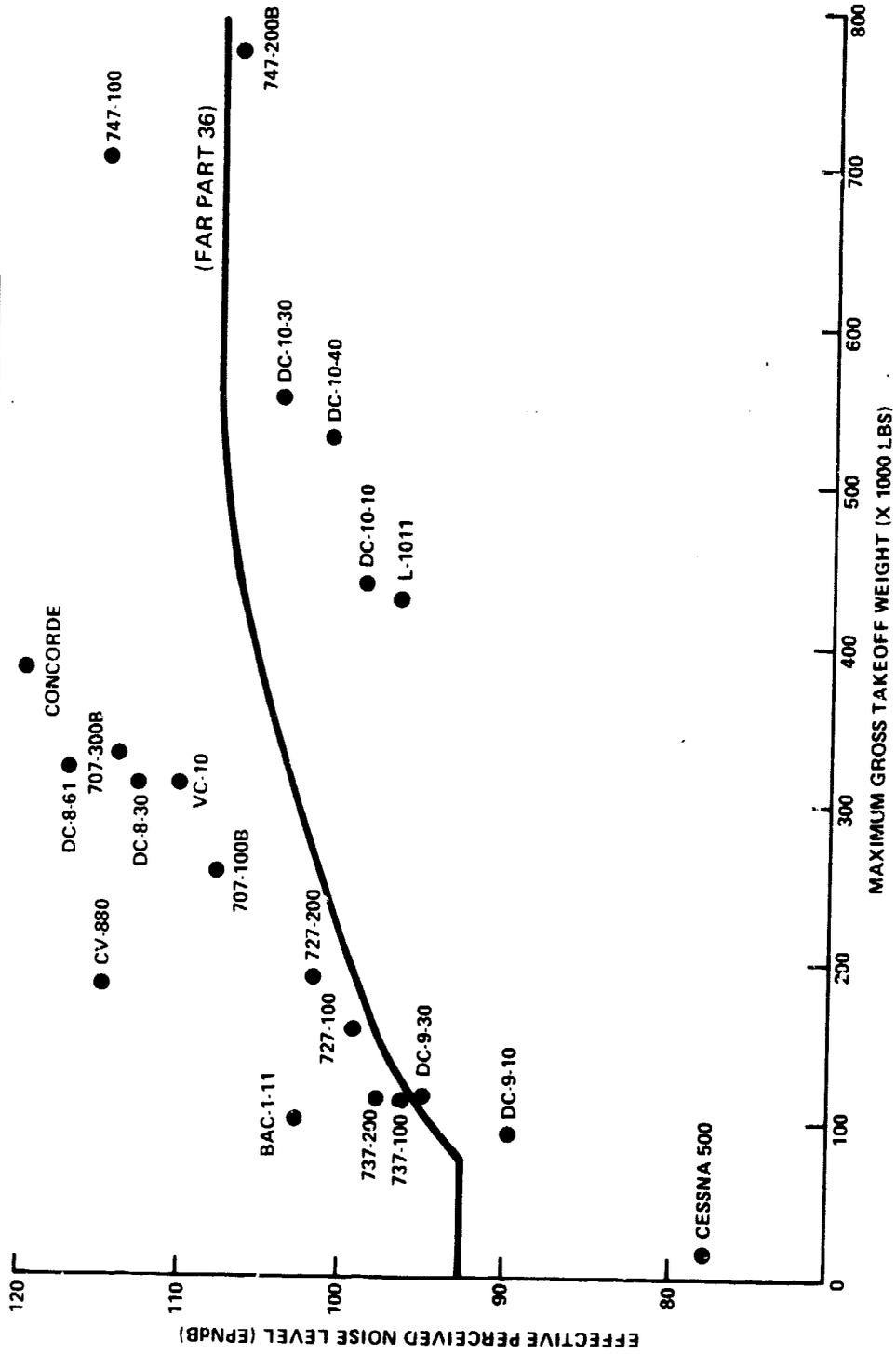
TOTAL UNITED STATES AVERAGE DAILY
SCHEDULED AIR CARRIER JET OPERATIONS 1/
FOR 1975

<u>Airplane type</u>	<u>Average daily number of operations</u>	<u>Percent</u>	<u>Percent meeting F.A.R.-36 noise standards</u>
707/DC-8	2,225	10	0
747	411	2	54
DC-10/L-1011	1,340	6	100
727	9,208	41	26
737/DC-9/BAC 1-11	<u>9,334</u>	<u>41</u>	<u>8</u>
Total	<u>22,518</u>	<u>100</u>	<u>21</u>

1/ An operation is a takeoff or a landing.
Source: FAA Aviation Noise Abatement Policy -
November 18, 1976.

The chart on the following page shows the current noise levels of the various subsonic aircraft and the Concorde compared to the F.A.R.-36 noise standard.

TAKEOFF NOISE OF CONCORDE COMPARED WITH SUBSONIC AIRCRAFT
 AT FAR-36 MEASURING POINT
 (3.5 NAUTICAL MILES FROM BRAKE RELEASE) - BEFORE RETROFIT



Source: April 1977, Draft EIS on Noise Regulation and Type Certification Alternatives
 for Civil Supersonic Aircraft

FUTURE NOISE LEVELS

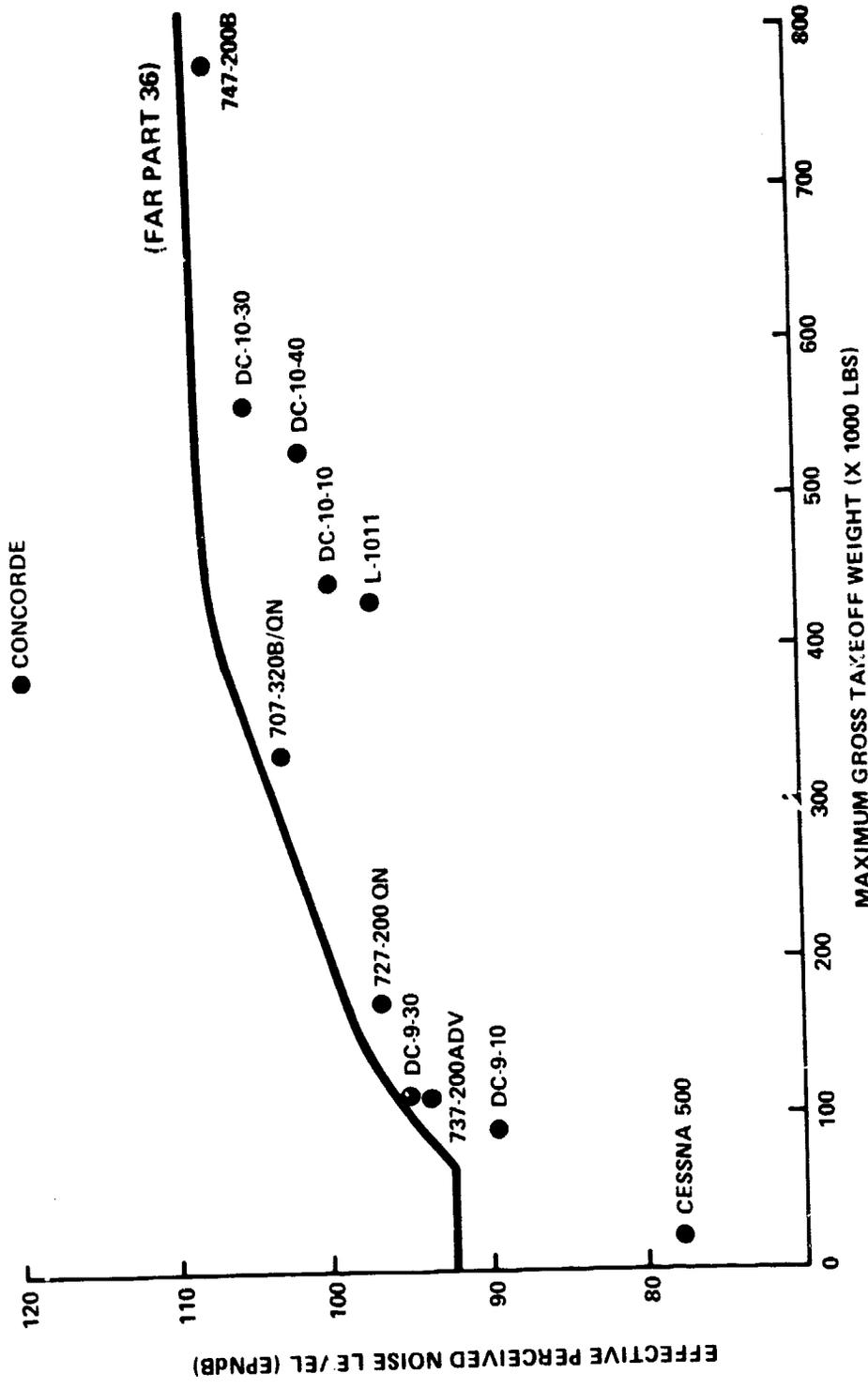
To further reduce aircraft noise, FAA promulgated a regulation (effective January 1977) that required civil subsonic jet aircraft with maximum weight in excess of 75,000 pounds that did not meet previous F.A.R.-36 noise standards be retired from the fleet or modified (retrofitted) to meet noise standards by 1985 on the following phased-compliance schedules:

<u>Airplane type</u>	<u>Deadline</u>
747	Within 6 years; with one-half to be completed within 4 years
727, 737, DC-9, BAC1-11	Within 6 years; with one-half to be completed within 4 years
707, 720, DC-8, CV-990	Within 8 years; with one-quarter to be completed within 4 years and one-half to be completed within 6 years.

It is estimated that financing for this retrofit or replacement provision could cost the airlines as much as \$7.2 billion.

The following chart shows the estimated noise levels of the various subsonic aircraft after they are retrofitted. It is apparent that all the aircraft--except the Concorde--are projected to comply with the F.A.R.-36 noise standards. Since the Concorde cannot be retrofitted, its noise level would remain at its current level.

**TAKEOFF NOISE OF CONCORDE COMPARED WITH SUBSONIC AIRCRAFT
AT FAR-36 MEASURING POINT
(3.5 NAUTICAL MILES FROM BRAKE RELEASE) - AFTER RETROFIT**



Source: April 1977, Draft EIS on Noise Regulation and Type Certification Alternatives for Civil Supersonic Aircraft

CONCLUSIONS

The Concorde is already noisier than existing subsonic aircraft and would be significantly noisier than subsonic aircraft that will be retrofitted or replaced to meet standards. Officials of FAA, EPA, and NASA all agreed that the present-generation Concorde cannot be retrofitted to meet F.A.R.-36 standards. It appears that permitting the introduction of the Concorde or any other aircraft type that cannot presently meet noise standards or cannot be retrofitted to meet these standards is counter to the thrust of the national noise abatement effort.

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225-6427

NINETY-FIFTH CONGRESS
Congress of the United States
House of Representatives
 ENVIRONMENT, ENERGY, AND NATURAL RESOURCES
 SUBCOMMITTEE
 OF THE
 COMMITTEE ON GOVERNMENT OPERATIONS
 RAYBURN HOUSE OFFICE BUILDING, ROOM B-371-B-C
 WASHINGTON, D.C. 20515
 May 25, 1977

Mr. Elmer B. Staats
 Comptroller General of the
 United States
 General Accounting Office
 441 G Street, N.W.
 Washington, D. C. 20548

Dear Mr. Staats:

On April 4, 1977, GAO's Mr. Wilbur Campbell testified before this subcommittee on your report dated March 7, 1977 entitled "Noise Pollution: Federal Programs to Control It Has Been Slow and Ineffective," (CED-77-42). The Members of the subcommittee share the views expressed in that report. Your staff have been particularly helpful in our continuing concerns about the noise pollution resulting from the Concorde aircraft. Your report confirmed many of the interagency problems associated with aircraft noise.

Our subcommittee intends to pursue the Concorde issue and your assistance is desirable. Before consideration is given to granting Concorde permanent permission to land at U.S. Airports, we believe that some unanswered questions need to be resolved. We are requesting that your office conduct an investigation of the possible adverse noise effects of this airplane.

Specifically, we are requesting that GAO:

- Prepare a chronology of actions taken by the Federal and State Governments concerning regulation of the Concorde.
- Determine the roles of the Environmental Protection Agency and the Federal Aviation Administration in the present Concorde controversy.

Mr. Elmer B. Staats

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May 25, 1977

--Determine the adequacy of the noise monitoring system being used to record the Concorde noise levels at Dulles International Airport.

--Analyze citizen complaints received at Dulles to determine what, if any, effects the Concorde trial period has had on the surrounding communities.

--Analyze the accuracy of the public opinion poll concerning Concorde contracted by the Department of Transportation.

--Evaluate, to the extent possible within the time frame stated below, the actions proposed to the Port Authority of New York that allegedly would reduce the noise levels of the Concorde if it is allowed to land at John F. Kennedy Airport.

--Compare the noise generated from the Concorde with sub-sonic aircraft, and indicate whether it can meet current or proposed U.S. noise standards?

We would appreciate your report on or before September 15, 1977, the completion date for the 16-month Concorde trial period at Dulles Airport.

Sincerely yours,


LEO J. RYAN
Chairman